12. Sampling by Variables:
Analysis of distributions, Hamilton Lot Plot. Check on sample size, non normal, truncated, skewed plots and strays.

13 and 14. Sampling by Variables:
Jacobson's monogram, methods of determining sample size, consumers and producers risks, MIL-STD-414. Variables sampling applied to machine and process capability.

15. Tests of Significance:
't' test for the comparison of two averages.

16. Tests of Significance:
'F' test for the comparison of two variances or standard deviations.

17. Tests of Significance:
'Chi' square test, frequency data and contingency tables.

18. Analysis of Variance:
Single factor and two factor situation, use of range in place of standard deviation.

19 and 20. Analysis of Variance:
Analysis of components of Variance.

Text for Course:
A.S.T.M. Manual on Quality Control of Materials. This text will be made available through the University Book Store. Military Standard Procedures for Inspection by Attributes and Variables; MIL-STD-105C and MIL-STD-414 will be supplied to the students.

LECTURERS:

Mr. R. V. Ward, B.Sc.
Senior Member A.S.Q.C.,
Supervisor, Industrial Engineering,
Canadian Industries Limited.

Mr. S. M. Prout, P.Eng.,
Senior Member A.S.Q.C.,
Design Engineer,
Canadian Controllers Limited.

UNIVERSITY OF TORONTO
UNIVERSITY EXTENSION

Session 1963–64

Course in

QUALITY CONTROL
THROUGH
STATISTICAL METHODS

in co-operation with the
TORONTO SECTION,
AMERICAN SOCIETY FOR QUALITY CONTROL

QUALITY CONTROL THROUGH
STATISTICAL METHODS

Tuesdays   **20 Lectures**

The control of quality of a manufacturing operation or process demands two major requirements. The first is the scientific control of the operations and the second, the methods of collecting and analysing information about the process. This is done by applying special techniques based upon known and tried statistical theories. This course, which reviews briefly the content of the introductory course, is mainly concerned with demonstrating what these techniques are, how they can be applied, where they are suitable and how they operate. Also, the analysis of the information is important. The coverage of the course will include the classical techniques and many of the new ones for which tables and procedures are now readily available. The importance of this course is to show that quality control is far more than scientific inspection and is a management tool of great value.

Minimum Requirements:

High school mathematics with a knowledge of elementary algebra and graphs and previous participation in a course in Quality Control or Applied Statistics.

COURSE CHAIRMAN:

Mr. R. V. Ward,
Supervisor, Industrial Engineering,
Canadian Industries Ltd.

TIME: 7:30 p.m.
Fall Term: October 8th–December 10th.
Winter Term: January 7th–March 10th.

PLACE: 404 Mechanical Building.

FEE: $40.00

Registration:

By mail or in person at Room 201, 84 Queen's Park, 9 a.m. to 5 p.m. daily, except Saturdays. Information may be obtained by telephoning 928–2393, 928–2394, 928–2395 or 928–2396.

PROGRAMME

1. **Introduction to Quality Control:**
   Historical background, work of Shewhart, Dodge and Romig. The problem, nature and definition of control. Chance and assignable causes. The role of statistical theory. Advantages secured through control. Detection of lack of control. Definition of Quality. Specifications for quality.

2. **Presentation of Data:**
   The problem of presentation of data, grouped and ungrouped data, simple statistics, measurement of variation. The idea of sampling and probability. Inverse probability. The problem of collecting reliable data, errors of measurement. Nature of variation. The normal law of probability. Gaussian, binomial, poisson and hypergeometric distributions.

3 and 4. **Control Charts—Variables:**
   X & R charts, control limits, chart factors, trend charts, charts with modified limits, sensitivity of averages, assignable causes, definitions.

5 and 6. **Control Charts—Attributes:**
   p, pn and c charts, control limits, limits with variable sample sizes, charts with two-way limits, table and charts for calculating limits, definitions.

7. **Sampling by Attributes—Introduction:**
   Introduction to sampling, operating characteristics of sampling plans, consumers and producers risks, definitions and terminology, acceptance and rejection numbers.

8. **Sampling by Attributes—Sampling Plans:**
   Attribute, Variable, Lot and Continuous Sampling Plans. Single, Double, Multiple and Sequential plans.

9. **Sampling by Attributes—MIL-STD-105C:**
   Available tables, advantages, levels of inspection, normal tightened and reduced sampling, practical application.

10. **Sampling by Variables—Introduction:**
    Tally Sheet, zeroed and coded data, G.E. Process Sheet and Slide Rule, method of reducing calculation, sub sample and range method of obtaining sigma.

11. **Sampling by Variables—Graphical Methods:**
    Probability paper, normal and log normal data. Transformed data.